ORIGINAL RESEARCH ARTICLE

Determinants of Male Circumcision for HIV/AIDS Prevention in East Central Uganda

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Abstract

Safe Male Circumcision (SMC) is one the effective strategies for reducing HIV transmission. The paper examines factors associated with SMC for HIV prevention, based on 4,979 males from East Central Uganda. Data were analysed using chi-squared tests and multinomial logistic regression. Older males aged 31 years and above ($p < 0.001$), from predominantly non-circumcising districts (Buyende - $p < 0.001$, Kaliro $p < 0.01$, and Kamuli - $p < 0.01$); who had neither used condoms ($p = 0.03$) nor tested for HIV ($p < 0.001$) were less likely to circumcise for HIV prevention. Males who were assessed in 2012 ($p < 0.001$) three years after program implementation were more likely to circumcise for HIV for HIV prevention. Males that did not take measures to prevent HIV infection were less likely to undertake SMC and are therefore highly vulnerable to infection. These (together with older males, and males from non-circumcising districts) should be targeted for promotion of SMC alongside other HIV preventive measures. For better results, the benefits SMC for children as well as adults require emphasis. Wider coverage of SMC services should entail adequate equipping of public and where feasible, private facilities and appropriate training of health personnel countrywide. *(Afr J Reprod Health 2016; 20[1]: 80-87).*

Keywords: Male circumcision, HIV/AIDS prevention, Uganda.

Résumé

La Circoncision masculine sans danger (CMSD) est l'une des stratégies efficaces pour réduire la transmission du VIH. L'article étudie les facteurs associés à la CMSD pour la prévention du VIH, basé sur 4,979 hommes de l'Est de l'Ouganda Central. Les données ont été analysées à l'aide des tests de chi carré et la régression logistique multinomiale. Les hommes plus âgés, de 31 ans et plus ($p < 0,001$), qui viennent principalement de districts qui ne pratique pas la circoncision masculine (Buyende - $p < 0,001$, Kaliro $p < 0,01$, et Kamuli - $p < 0,01$); qui n'avaient ni utilisé des préservatifs ($p = 0,03$), ni testé pour le VIH ($p < 0,001$) étaient moins susceptibles de subir la circoncision pour la prévention du VIH. Les hommes qui ont été évalués en 2012 ($p < 0,001$) trois ans après la mise en œuvre du programme étaient plus susceptibles de subir la circoncision pour la prévention du VIH. Les hommes qui ne prennent pas des mesures pour prévenir l'infection du VIH étaient moins susceptibles d'entreprendre la CMSD et sont donc très vulnérables à l'infection. Ceux-ci (ainsi que les hommes plus âgés, et les hommes des districts ou la circoncision n'est pas pratiquée) devraient être ciblés pour la promotion de la CMSD avec d'autres mesures de prévention du VIH. Pour obtenir les meilleurs résultats, il faut mettre l'accent sur les avantages de la CMSD pour les enfants ainsi que pour les adultes. Une couverture plus large des services de CMSD devrait équiper de façon adéquate les établissements de santé publics et si possible, des établissements privés et former de manière appropriée le personnel de santé dans tout le pays. *(Afr J Reprod Health 2016; 20[1]: 80-87).*

Mots-clés: Circoncision masculine, prévention du VIH / SIDA, Ouganda

Introduction

HIV/AIDS is a global pandemic with approximately 35 million people living with the disease[1]. Sub-Saharan Africa is the most affected region with an estimated 70% (24.7 million people) of global HIV/AIDS cases[1]. Uganda's HIV/AIDS prevalence rate of 7.3% is the highest in the East African region[2-4].

By 2013, approximately 2.1 million people globally became newly infected with HIV[1].

The figure for sub Saharan Africa stands at 1.5 million people, accounting for 70% of the global new infections[1]. The rate of new infections in Uganda remains high with over 120,000 people newly infected with HIV annually[2]. New infections negate progress registered through increased access to anti-retroviral drugs[5]. Prevention of new infections is essential to reversing the epidemic[1,6]. WHO and UNAIDS recommended Safe male circumcision (SMC) as an effective strategy for HIV/AIDS prevention.

Hence, SMC was implemented in 2009 in 16 priority countries in sub Saharan Africa, Uganda inclusive[1,7]. SMC is particularly important for Uganda, given the recent increase in the HIV prevalence rate (from 6.4% in 2005 to 7.3% in 2010)[4,8].

With respect to determinants of SMC, a study in Rakai, Southern Uganda found no significant association between accepting SMC and socio-demographic characteristics[9]. However, research findings of a study conducted among the Luo of Western in Kenya, a non-traditionally circumcising community (using chi-squared tests) suggested that age, marital status, and religion were associated with the uptake of SMC. With respect to age, SMC was more popular among younger people[10]. Findings based on a mass SMC intervention in Kampala Uganda also revealed that SMC mainly attracted younger males with a mean age of 25 years[11].

According to a WHO report, religion is a key determinant of male circumcision (MC). Two in three of circumcised males globally are Muslims. Other determinants of MC are ethnicity, perceived health and sexual benefits and desire to conform to social norms[7]. Findings of earlier studies in Uganda revealed that reasons for MC were mainly associated with culture and religion[12,13,14], although HIV prevention benefits are still realized. Ethnicity is a significant predictor of Male Circumcision (MC) in Uganda[15], as well as East Africa in general and Southern Africa[12]. Non-religious circumcising ethnic groups in Uganda include the Bagisu, Sebei, Bakhonzo and Baamba[16]. East Central region has the highest proportion of Muslims in the country[17,18]. Circumcision of Muslims in Uganda takes place during infancy[9]. Knowledge about a disease and the benefits of preventive measures has been associated with uptake of preventive measures[12, 19]. Whereas it is assumed that perceived HIV risk due to risky sexual behaviour could predict uptake of MC, studies have shown that the association is not significant[8,20].

In the developed countries, MC is more prevalent among the upper classes, persons with higher levels of education and incomes. However, in sub Saharan Africa, the pattern is not consistent.

While SMC is associated with high socio economic status in Tanzania and Ethiopia, it is not the case for Lesotho[7]. Although acceptance of MC is relatively high in Uganda[8,14,21] and elsewhere[7,22,23] the requisite services are not always readily available at community level[24]. Increased uptake of SMC in East Central Uganda is among other factors attributed to awareness campaigns and increase in availability of sponsored MC surgical services that include counselling. The number of supported SMC static sites (health facilities) increased from five in 2010 to 19 sites in 2012[14,23].

Studies have established that MC can reduce the risk of HIV transmission[25-27]. However, by 2006, only 30% of the world's male population circumcised[7,23]. Between 2007 and 2012, 3.2 million men in Africa were circumcised through specific services that provided voluntary safe male circumcision. Uganda's current MC prevalence (30%) is below its target of 80% MC coverage among uncircumcised males by 2015[8,14]. Scaling up SMC is necessary for attaining national and global targets. However, evidence on associated determinants in the Ugandan context is limited. Available literature on MC mainly focuses on its efficacy, prevalence, acceptability and comparison of behaviours of circumcised and uncircumcised males[9,14,21,26,28]. Assessing the determinants of circumcision for HIV prevention is essential for targeted promotion of SMC.

Methods

The study is based on data sourced from Strengthening Tuberculosis and HIV/AIDS Responses in East Central Uganda (STAR-EC). Permission to use the data was obtained from STAR-EC. STAR-EC is one of the four major programs that promote SMC as a preventive measure against HIV/AIDS in Uganda. The program operates in nine districts of the Busoga (East Central) sub region of Uganda, serving a population of about three million people[14]. The districts are Bugiri, Iganga, Kaliro, Kamuli, Mayuge, Namutumba, Namayigo, Luuka and Buyende. The Basoga ethnic group, which constitutes 70% of the total population, is a

culturally non-circumcising group. However, about 26% of the population is Muslim[17].

The analysis is based on 4,979 records of males aged 15 to 54 years. The STAR-EC program used Lots Quality Assurance Sampling (LQAS) to select respondents from the nine districts of East Central Uganda. Data were collected annually from 2009 to 2012. Following the LQAS approach, Supervision Areas (SAs) were represented by sub-counties, and lots or program areas were represented by districts. A minimum of five supervision areas per district was required to obtain an acceptable 95% confidence level in the LQAS. For details concerning this sampling approach, please see Valadez and colleagues[29]. Derivation of SAs was based on population size and geographical locations of the sub-counties within each district. Weighting in respect of population size was applied in driving SAs for districts with more than five sub counties. Sub counties with higher populations had a higher chance of constituting a standalone SA, while low population sub counties that shared boundaries could be combined into one SA. SAs were defined at the baseline stage[30].

Each district constituted a sampling unit divided into five SAs. The assessment adopted a two-stage sampling plan where 19 villages were randomly selected per SA, with proportionate sample sizes (based on population sizes of the respective villages). This was followed by random selection of a household from each selected village. Households were selected from lists of households obtained from local authorities. Updated lists of village residents were obtained from village local councils. In the absence of such lists, village authorities in partnership with interviewers compiled the lists[30].

With respect to variables and measurements, the outcome variable was coded into three categories: 0 = not circumcised, 1 = circumcised for HIV prevention, 2 = circumcised for other reasons. The second category "1" included males circumcised for HIV or STI prevention. The third category "2" included males who were circumcised for religious, cultural purposes and other reasons that are not associated with disease

prevention. Independent variables were age, district, level of education, ever had sexual intercourse, marital status, awareness of place to obtain condoms, ever used a condom, perceived risk of HIV/AIDS infection, ever tested for HIV/AIDS and year of program assessment.

The analysis entailed three stages: frequency distributions to describe characteristics of the respondents; Chi-squared ($\chi2$) tests; and multinomial logistic regression. At the bivariate level of analysis, we assessed associations between independent variables and the dependent variable using chi-squared tests. The level of statistical significance was set at $p < 0.05$. All variables were considered at multivariable level of analysis ($p < 0.05$). Relative Risk Ratios (RRR) was used to present the results with the level of statistical significance set at $p < 0.05$. In the multinomial logistic regression model, we used "not circumcised" as the base or comparison category.

Results

Out of the 4,979 males interviewed, 7% circumcised for HIV prevention while 30% were circumcised for other reasons, chiefly religious or cultural. Table 1 presents a descriptive summary of males' independent factors and their association with reason for circumcision. Results in Table 1 show that about 62% of the respondents were below 30 years. Districts of residence were equitably represented ranging from 9% for Buyende and Luuka to 13% for Mayuge. Over a half (59%) of the males had primary or no education. The majority (84%) had ever had sexual intercourse and 65% had ever been or were currently married or cohabiting. While 90% knew where to obtain a condom, only 54% had ever used one. Just under half (48%) had a high HIV risk perception and the same proportion (48%) had ever tested for HIV.

All independent factors were significantly associated with (reasons for) circumcision. Proportions of males who circumcised for HIV prevention were higher among younger males; in the districts of Namayingo, Luuka and Bugiri; and males with secondary or higher education. Proportions were also higher among males who

Table 1 Percentage Distribution of Males' Independent Factors and (Reasons For) Circumcision

Variables	% of males	Frequency (n = 4,979)	% not circumcised	% circumcised for HIV prevention	% circumcised for other reasons
Age			**p = 0.000**		
15 – 19	30.8	1,534	62.6	8.5	28.9
20 – 29	31.1	1,546	61.1	9.1	29.8
30 – 39	19.6	975	62.2	4.3	33.5
40 Above	18.6	924	67.2	3.1	29.7
Districts			**p = 0.000**		
Bugiri	11.6	577	45.9	8.0	46.1
Buyende	8.9	443	77.4	5.0	17.6
Iganga	11.8	587	49.9	6.3	43.8
Kaliro	12.1	602	79.1	6.1	14.8
Kamuli	12.6	627	73.8	5.7	20.4
Luuka	9.0	450	68.0	8.0	24.0
Mayuge	12.5	614	47.2	7.2	45.6
Namayingo	9.3	462	73.4	9.5	17.1
Namutumba	12.4	617	57.9	6.6	35.5
Education level			**p = 0.000**		
None	6.1	303	68.6	3.0	28.4
Primary	52.4	2,607	61.8	6.2	32.0
Secondary and above	41.6	2,069	63.4	8.3	28.3
Ever had sexual intercourse			**p = 0.000**		
Yes	84.1	4,188	62.1	6.8	31.1
No	15.9	791	67.1	7.2	25.7
Marital Status			**p = 0.000**		
Single/no partner	26.4	1,313	65.7	7.7	26.6
Ever/currently married or cohabiting	65.4	3,254	62.8	6.1	31.1
Single with partner	8.3	412	54.6	10.7	34.7
Knows where to obtain condoms			**p = 0.000**		
Yes	90.1	4,484	62.3	7.4	30.4
No	9.9	495	68.7	2.6	28.7
Ever used a condom					
Yes	53.9	2,685	60.1	8.2	31.7
No	46.1	2,294	66.2	5.4	28.5
Perceived risk of contracting HIV/AIDS			**p = 0.000**		
High Risk	48.0	2,392	65.3	6.1	28.6
Low Risk	42.2	2,102	60.5	6.9	32.6
No Risk	8.6	426	59.4	12.2	28.4
Do not know	1.2	59	76.3	1.7	22.0
Ever tested for HIV/AIDS			**p = 0.000**		
Yes	47.7	2,377	59.4	9.2	31.4
No	52.3	2,602	66.1	4.8	29.1
Year of program assessment			**p = 0.000**		
2009	18.1	901	63.5	3.4	33.1
2010	27.1	1,348	66.6	4.6	28.8
2011	27.4	1,362	65.8	4.7	29.5
2012	27.5	1,368	56.0	13.6	30.4

Note. P – p-value

Table 2 Relative Risk Ratios (and standard errors) from Multinomial Logistic Regression Analyses Assessing Associations between Independent Factors and Reasons for Circumcision versus not circumcising among Males in Eastern Uganda

Independent Variables	HIV Prevention			Other Reasons		
	RRR [a]	SE [b]	p-value	RRR	SE	p-value
Age						
15-19 [†]	1.000	.	.	1.000	.	.
20-29	0.817	0.134	0.219	0.923	0.098	0.456
30-39	0.409	0.094	**0.000**	0.999	0.127	0.997
40 Above	0.294	0.074	**0.000**	0.848	0.111	0.211
Marital Status						
Single with no partner[†]	1.000	.	.	1.000	.	.
Married or Cohabiting	1.237	0.249	0.291	1.249	0.157	0.077
Single with partner	1.280	0.290	0.275	1.529	0.219	**0.003**
Education level						
None [†]	1.000	.	.	1.000	.	.
Primary	1.695	0.611	0.143	1.232	0.178	0.149
Post-primary	1.703	0.622	0.145	1.046	0.158	0.764
District						
Bugiri [†]	1.000	.	.	1.000	.	.
Buyende	0.310	0.087	**0.000**	0.210	0.032	**0.000**
Iganga	0.749	0.184	0.241	0.910	0.112	**0.044**
Kaliro	0.453	0.110	**0.001**	0.184	0.026	**0.000**
Kamuli	0.449	0.109	**0.001**	0.285	0.038	**0.000**
Luuka	0.626	0.156	0.061	0.349	0.050	**0.000**
Mayuge	0.906	0.212	0.677	0.987	0.120	0.920
Namayingo	0.652	0.155	0.072	0.223	0.034	**0.000**
Namutumba	.649	0.154	0.069	0.598	0.074	**0.000**
Awareness of place to obtain Condom						
Yes [†]	1.000	.	.	1.000	.	.
No	0.511	0.153	0.026	1.001	0.116	0.992
Ever used a condom						
Yes [†]	1.000	.	.	1.000	.	.
No	0.710	0.111	**0.030**	0.945	0.075	0.478
Ever tested for HIV						
Yes [†]	1.000			1.00	.	.
No	0.555	0.071	**0.000**	0.888	0.061	0.090
Perceived risk of HIV						
High Risk [†]	1.00	.	.	1.00	.	.
Low Risk	1.021	0.133	0.870	1.318	0.093	**0.000**
No Risk	1.297	0.258	0.192	1.200	0.165	0.186
Do not know	0.339	0.346	0.291	0.833	0.277	0.585
Ever had sexual intercourse						
Yes [†]	1.000	.	.	1.000	.	.
No	1.043	0.251	0.859	0.950	0.129	0.680
Year of program assessment						
2009 [†]	1.000	.	.	1.000	.	.
2010	1.286	0.299	0.278	1.035	0.104	0.727
2011	1.288	0.031	0.278	1.036	0.105	0.726
2012	4.170	0.902	**0.000**	1.264	0.134	**0.028**
Constant	0.104	0.048	0.000	0.069	0.146	0.080

*Note. Assessment is based on Multinomial logistic; where, base category is not circumcised; **n=4,979**, LR Chi2 =691.8, p < 0.001; [†] Reference categories; [a] Relative Risk Ratio; [b] Standard Errors*

had never had sexual intercourse; were single with a partner; knew where to obtain condoms; had ever used condoms; perceived themselves to be at risk of contracting HIV; had ever tested for HIV and were assessed in 2012. Proportions of uncircumcised males were higher among males above 40 years; in the districts of Kaliro and Buyende; uneducated; males who had never had sexual intercourse; single with no partner; did not know where to get condoms; had never used condoms; and did not know whether they were at risk of contracting HIV.

Determinants of Reasons for MC Circumcision

Predictors of reasons for male circumcision were assessed using multinomial logistic regression, controlling for independent factors. Compared to not circumcising (the reference category) significant predictors of circumcision for HIV prevention were district of residence, having ever tested for HIV/AIDS, used a condom, age and year of program assessment ($p < 0.05$). Males aged 31-40 (RRR = 0.4; $p < 0.001$) and above 40 years (RRR = 0.3; $p < 0.001$) were less likely to circumcise for HIV prevention compared to those aged 15-20. Males from Buyende (RRR = 0.3; $p < 0.001$), Kaliro (RRR=0.5; $p < 0.01$) and Kamuli (RRR = 0.5; $p < 0.01$) were less likely to be circumcised for HIV/AIDS prevention compared to males from Bugiri District. Males who had not tested for HIV/AIDS were less likely to circumcise for HIV prevention compared to those who had ever tested for HIV/AIDS (RRR = 0.6; $p < 0.001$). Likewise, males who had never used a condom were less likely to circumcise for HIV prevention compared to those who had ever used a condom (RRR = 0.7; $p = 0.03$). Males who were assessed in 2012 were more likely to circumcise for HIV prevention compared to males assessed in 2009 (RRR = 4.2; $p < 0.001$).

MC for HIV prevention was not significantly associated with marital status, level of education, knowledge of source of condoms, perceived risk of contracting HIV and whether the respondent has ever had sex. The second model addressed circumcision for other reasons (mainly religious), with not circumcising as the base category. The significant factors were district,

Assessment Of Emergency Obstetric Care Services marital status, and perceived risk of HIV/AIDS and year of study ($p < 0.05$). Males from the districts of Buyende (RRR = 0.2; $p < 0.001$), Kaliro (RRR=0.2; $p = 0.04$), Kamuli (RRR = 0.3; $p < 0.001$), Luuka (RRR = 0.4; $p < 0.001$), Namayingo (RRR = 0.2; $p < 0.001$) and Namutumba (RRR = 0.6; $p < 0.001$) were less likely to circumcise for other reasons compared to Bugiri district. Circumcision for other reasons was more likely among single males with partners compared to the single males with no partner (RRR = 1.5; $p < 0.01$); males who had a low HIV risk perception compared to those with a high HIV risk perception (RRR = 1.3; $p < 0.001$); and males assessed in 2012 compared to those who were assessed in 2009 (RRR = 1.3; $p = 0.03$). Age, level of education, awareness of source of condoms, condom use, and HIV testing did not predict circumcision for other reasons ($p > 0.05$).

Discussion

Whereas the reported acceptance of MC is relatively high[8,21] the proportion of males undertaking the procedure for HIV prevention (7%) is still low[14]. Circumcision for other reasons, in this case religion, is still predominant[13-15,31,32]. Our findings show that older men (31 years and above) were less likely to circumcise for HIV prevention. This finding is in agreement with findings elsewhere in Uganda and Western Kenya where the uptake of SMC was higher among younger males[10,11]. Males in the districts of Buyende, Kaliro and Kamuli districts were less likely to circumcise. These districts are located in one geographical area that is predominantly Christian and is among the least developed in East Central region[7,17].

Males who had not tested for HIV or used condoms were less likely circumcise for HIV prevention. Results of the 2011 UDHS suggest that HIV testing is lower among males of a low socio-economic status and males who were not sexually active[7,18]. Such males are likely to have low levels of awareness and HIV risk perception. Condom use and testing for HIV are associated HIV prevention and so is SMC.
The higher likelihood of circumcision for HIV prevention in 2012 compared to 2009 is associated

with the impact the SMC program. The program entailed institution of free SMC services at static sites (health facilities) which increased from five in 2010 to 19 sites in 2012 and awareness campaigns[14,23,33]. Descriptive statistics show that the proportions circumcised males increased with each subsequent year of the intervention[2].

Similar to Grey and colleagues' findings[9], specific aspects of socio economic status namely marital status and level of education did not predict circumcision for HIV prevention. Whereas knowledge about a disease and the benefits of preventive measures has been associated with uptake of preventive measures[12,14], knowledge of source of condoms did not predict circumcision for HIV prevention. Studies elsewhere[9,20] too established that HIV risk perception was not a significant predictor of circumcision for HIV prevention. Predictors of circumcision for other reasons mainly reflect the Muslim population in East central region.

The study is based on secondary data, which did not include variables addressing social determinants of MC such as social desirability, ethnicity, economic status[7], and distance to health facilities that would have been beneficial to this analysis. The assessment was based in one cultural setting, namely Busoga. The findings are thus limited in establishing the influence of culture on circumcision for HIV prevention. For broader generalizations, future assessments should consider the omitted variables, and should conduct similar assessments in other regions of the country. Our findings are valuable in highlighting specific factors that should be considered in enhancing SMC uptake.

Conclusion

Predictors of circumcision for HIV prevention were district of residence, whether males had ever tested for HIV, ever used a condom, age and year of program assessment. SMC for HIV prevention is closely linked to other HIV prevention measures where males who were less likely to test for HIV or use condoms were also less likely to undertake SMC for HIV prevention. These are groups at risk

of HIV infection and therefore require targeting for promotion of SMC alongside other HIV preventive measures[5]. Interventions should apply well-tested approaches to engagement and awareness creation concerning SMC with emphasis on older males, males from less developed non-religious or traditionally non-circumcising localities, and those that do not take any HIV preventive measure. Government in partnership with non-government actors should ensure SMC service availability in public and where feasible, private facilities nationwide. In preparation for wider coverage, appropriate training of health personnel and adequate equipping of facilities is essential[34].

Contribution of Authors

Brian Kironde conceived, designed study, compiled data, and reviewed the manuscript.
Robert Wamala designed study, analyzed data and participated in the writing and reviewing of the manuscript.
Betty Kwagala designed study, participated in data analysis, prepared and reviewed the manuscript.
All authors approved the manuscript.

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